

WHAT IS CLAIMED IS:

1. A motor-generator apparatus for a vehicle, operable for selective performing starting of an engine of said vehicle and generating electric power while said vehicle is running, having a synchronous type of generator-motor comprising:

    a housing,

    a stator core attached to an inner peripheral face of said housing,

    an armature winding formed on said stator core,

    a rotor core of cylindrical form, mounted for rotation within said housing with a predetermined gap between said rotor core and an inner periphery of said stator core,

    an even number of permanent magnets, respectively retained in an even number of magnet accommodation apertures each formed extending along an axial direction in said stator core, with an even number of field poles produced by said permanent magnets being arranged successively alternating in polarity around the outer circumference of said rotor core,

    magnetic shunt members inserted in respective magnetic shunt member accommodation apertures extending along said axial direction of the rotor core, for shunting magnetic fields produced by said permanent magnets,

    a field winding disposed at the inner peripheral face of said rotor core, for producing a magnetic flux within said magnetic shunt members along the axial direction, and

    a yoke member, disposed at the inner periphery of said rotor core, to form a flow path for the magnetic flux produced by said field winding, in conjunction with said rotor core and said magnetic shunt members;

    wherein each of said permanent magnets has a portion thereof disposed radially inward from said magnetic shunt members, and said rotor core has a magnetic path which extends from a region at the outer periphery of said rotor core through a region disposed between two circumferentially adjacent ones of said permanent magnets and to a region which is located radially inward from said permanent magnets.

2. A vehicle motor-generator apparatus as claimed in claim 1, wherein said magnet accommodation apertures are each of arc shape as seen in cross-section in a plane which is at right angles to a rotational axis of said rotor core, with end portions of each of said magnet accommodation apertures extending to the outer periphery of said rotor core and each magnet accommodation aperture having a circumferentially central portion which is disposed radially inward from said end portions thereof, and wherein said permanent magnets are mounted substantially in a depth direction of said magnet accommodation apertures, with

a circumferentially central portion of each of said magnet accommodation apertures formed with a concave shape in a circumferential face of said rotor core.

3. A vehicle motor-generator apparatus as claimed in claim 2, wherein respective circumferentially central points of said permanent magnets substantially coincide with circumferentially central points of said magnetic shunt members.

4. A vehicle motor-generator apparatus as claimed in claim 1, wherein the outer periphery of said rotor core has pairs of pole protrusion members, each formed between a pair of slits extending along the axial direction of said rotor core and each disposed between an arbitrary pair of said field poles, with a plurality of said pole protrusion members circumferentially disposed at equal spacings around the periphery of said rotor core.